GLAS Quality Assurance Plan

QAWG

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NCAR

Anita C. Brenner, Raytheon ITSS

Anita.Brenner@gsfc.nasa.gov

David W. Hancock, NASA/GSFC

- Single Instrument – Geoscience Laser Altimeter System (GLAS)
- Mission designed to measure
    - ice-sheet topography and associated temporal changes
    - cloud and atmospheric properties
    - land and water along-track topography
- Launch December 15, 2001

Meaning of terms

- QA is to
  - Show general integrity of data set
  - Show high level scientific integrity of data set
  - Denote any algorithm problems
- Browse products allows a potential user to determine if the corresponding granule is useful for their purpose

GLAS QA Components

- Quality Assurance Flags in Metadata
- Validation of each granule
- Browse products for each granule that infers quality of the granule

Quality Assurance Flags in Metadata

- Purpose – make user aware of general usefulness of granule
- 3-sets of flags
  - Automatic-based on general statistics created as product is produced
  - Operational – based on operator's perusal of browse products indicates problems not evident in general statistics
  - Science – based on science team perusal of data using visualizer or other specialized tools

Automatic QA flag in metadata

- Set when granule is created automatically based on general statistics
  - % missing data
  - % valid signal …
- 1-4 flags, one for each selected science parameter that is calculated from GLAS
- Static, will not be changed after delivered to NSIDC

Operational QA Flag in Metadata

- Four states; passed, inferred pass, passed with warning, and failed
- Set based on operator's perusal of browse products
- Static – Does not change after delivered to NSIDC
- Operator will only look at browse products for a subset of the granules – only way passed is set
- For granules for which the operator does not look at the browse products, the flag will be based on the automatic QA flag, inferred pass being set when the automatic QA flag says passed

Science QA Flag in Metadata

- Four states; passed, inferred pass, passed with warning, and failed
- Set based on science team investigation of data using visualizer or other tool
- Updateable

Validation of each granule

- Statistics are calculated during science processing and output onto a QAP file – every granule has a corresponding QAP file

- Validation software reads the granule, recalculates the statistics where possible and compares them to those in the QAP file

- Assures what is written on the product is consistent with the algorithms, units are correct, etc.

- Products that do not pass this test will not be distributed – infers product definition, operation, or coding problem

Browse Products

- Set of web-viewable images created from the QAP file

- Shows geographic and temporal distribution of granule major parameters

- Allows user to determine if their area of interest contains useful data for their project

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Browse Products -cont

- Allows operators and scientists to find irregularities in the parameters output on the granules
- Top level image will pictorially present coverage and general statistics
- Lower level images will show summary statistics overall and geographically for important parameters on products

Sample of GLA05 top level browse image

Product: GLA05. GRANULE: gla05_mmm_pr_ccc_tttt_s_02_ff.dat   Stan

Data start and end times: 2000 Oct 4 13:35:34.345200 — 2000 Oct 4 13:59:34.345200

|	N TOTAL	UNSATURATED		SIGNAL PRESENT			SUCCESSFUL FITS			
		N	% Total	N	% Total	% Unsat	N	% Total	% Unsat	% with Signal
TOTAL	57000	46740	82	42066	90	73	57000	100	100	100
ICE SHEET	39900	46170	81	43862	95	76	39855	100	100	100
SEA ICE	5700	48450	85	46028	95	80	5657	0	0	100
LAND	2850	53580	94	50901	95	89	2804	0	0	100
OCEAN	8550	47310	83	44471	94	78	8503	0	0	100

% X = % of current quantity relative to X
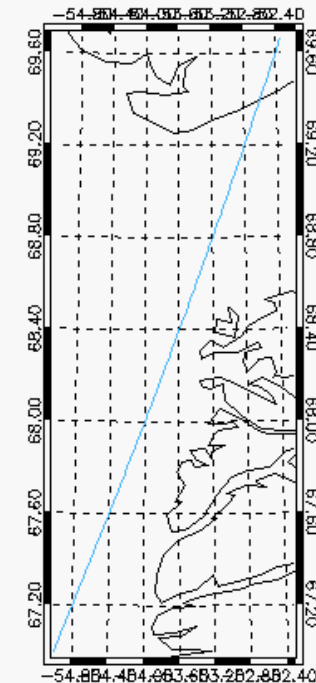
N TOTAL: Total number of returns in the granule

UNSATURATED: Number of unsaturated returns

SIGNAL PRESENT: Number of returns with signal above threshold

SUCCESSFUL FITS: Number of returns for which the fitting procedure was successful
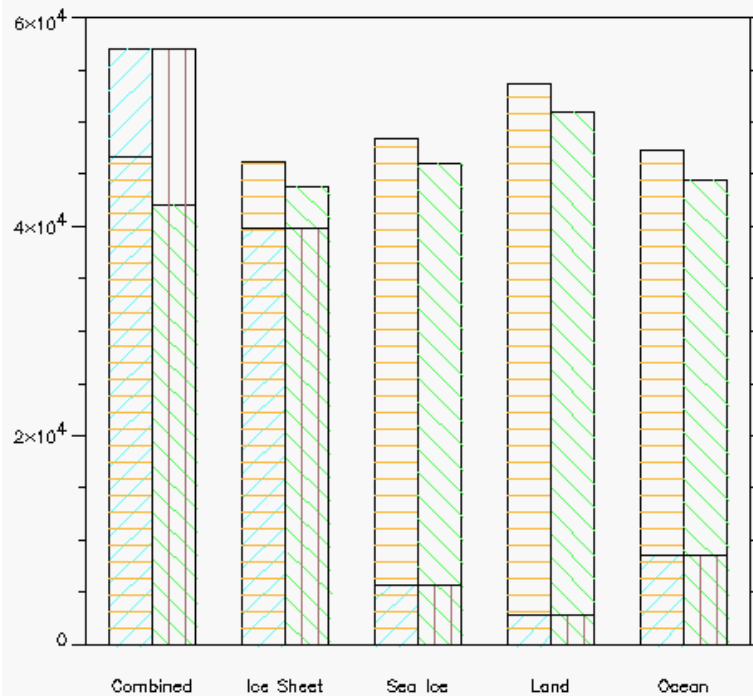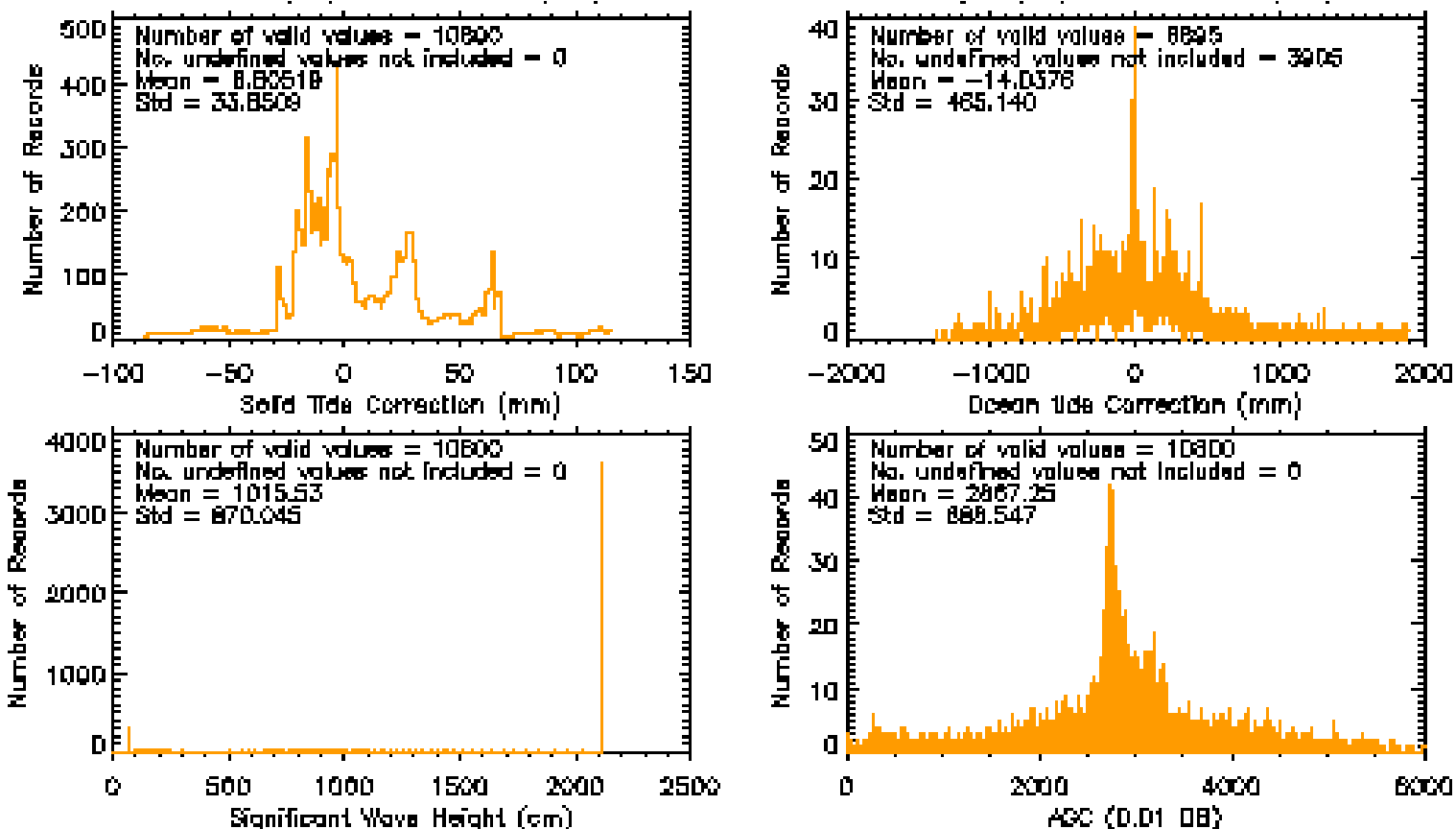
Plot Generated Tue Mar 20 09:38:18 2001

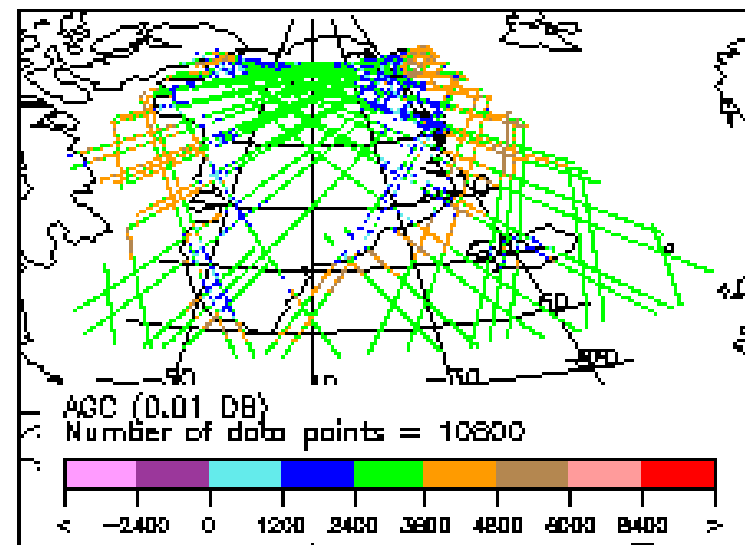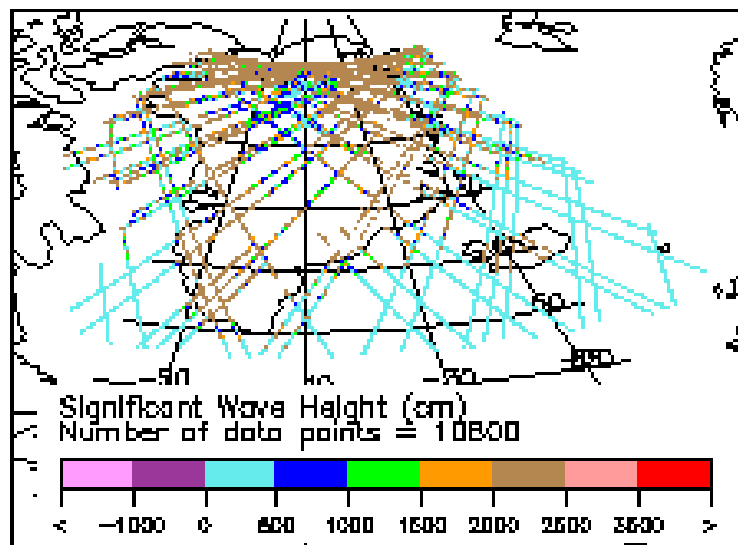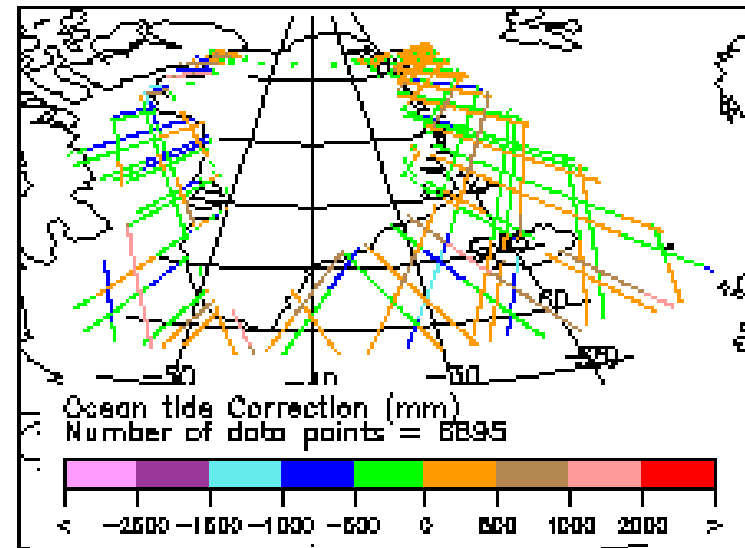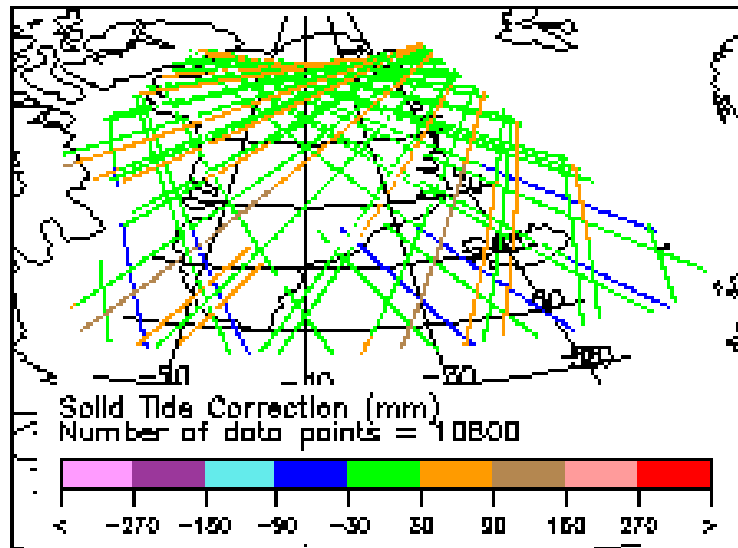# Sample of lower level summary of Statistical Distributions of Parameters– ERS-1 radar altimetry

Sample of Color-Coded Groundtracks showing geographic Distribution of Parameters – ERS-1 radar altimeter

ICESat QA Plan Summary

- 3 levels of QA on metadata, automatic, operational, and science team

- Browse products designed to allow first level of science QA of granule- operational

- Science QA performed at discretion of science team